pad; at least one die positioned on the die attach pad; at least one bonding wire for electrically connecting the die and the wire bonding pads; and a mold compound for encapsulating the die and the bonding wire to form a chip package, wherein the mold compound is formed in the aperture and the aperture increases an adhesion surface area for the mold compound.

The present invention is further directed to a method of providing a chip package, including the steps of providing a leadframe including a die attach pad centrally located therein and a plurality of wire bonding pads peripherally located therein; providing at least one aperture in the die attach pad; providing at least one die on the die attach pad; providing at least one bonding wire for electrically connecting the die and the wire bonding pads; and providing a mold compound for encapsulating the die and the bonding wire to form a chip package, wherein the mold compound is formed in the aperture and the aperture increases an adhesion surface area for the mold compound.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1A is a plan view of a conventional leadframe-based CSP.

Figure 1B is a cross sectional view of the conventional leadframe-based CSP cut along line 1B-1B of Figure 1A.

Figure 2A is a plan view of a leadframe-based CSP according to a first embodiment of the present invention.

Figure 2B is a cross-sectional view of the leadframe-based CSP cut along line 2B-2B of Figure 2A.

Figure 2C is a cross-sectional view of the leadframe-based CSP according to a second embodiment of the present invention.

Figure 2D is a cross-sectional view of the leadframe-based CSP according to a third embodiment of the present invention.

Figure 3 is a plan view of a leadframe-based CSP according to a fourth embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the drawings, the same reference numerals are used to indicate the same elements.

Figure 2A is a plan view of a leadframe-based CSP 50 according to a first embodiment of the present invention, and Figure 2B is a cross-sectional view of the leadframe-based CSP 50 cut along line 2B-2B of Figure 2A. As shown in Figs. 2A and 2B, the lead-frame-based CSP 50 includes a leadframe 51 including a die attach pad 52 centrally located therein and a plurality of wire bonding pads 54 peripherally located therein, one or more dies 56 mounted on the die attach pad 52, a plurality of bonding wires 58 for electrically connecting the dies 56 and the wire bonding pads 54, at least one aperture 65 disposed in the die attach pad 52 between the dies 56, and a mold compound 60 (shown in Fig. 2B) for encapsulating these components in a package structure. The leadframe 51 is made with a conductive material such as metal.

The aperture 65 is formed completely through the die attach pad 52 using known etching techniques such as full etch process, half etch process, a combination of full and

half etch processes, any other suitable etch process, stamping, coining, or any other suitable lead-frame manufacturing process. This aperture 65 provides a greater surface area to which the mold compound 60 could adhere, thereby enhancing the adhesion of the mold compound to the die attach pad 52. That is, the aperture 65 increases the adhesion surface area for the mold compound 60 without affecting the overall dimensions of the CSP 50. The increased adhesion surface area prevents the degradation of the Moisture Sensitivity Level (MSL) of the CSP 50, the introduction of contaminants such as dusts into the CSP 50, and the occurrence of electrical short circuits in the CSP 50.

Furthermore, in some applications such as high dynamic range devices (e.g., operating at ≥30 dB), the aperture 65 improves the RF grounding characteristics of such electronic devices. Excessively long ground paths can have the effect of raising the noise level for the high dynamic range devices. By separating the die attach pad 52 into sections by forming the aperture 65 in the die attach pad of the high dynamic range devices, the present invention provides means for reducing the length of the ground paths and confining the RF ground return currents to specific parts of the circuit board. This improves the RF grounding characteristics of the high dynamic range devices.

Figure 2C is a cross-sectional view of the leadframe-based CSP according to a second embodiment of the present invention. The leadframe-based CSP shown in Fig. 2C is identical to the leadframe-based CSP in Fig. 2B, except for an aperture 66. As shown in Figure 2C, in this embodiment, the aperture 66 is formed partially through the die attach pad 52 using known etching processes such as half etch processes. Because the aperture 66 increases the adhesion surface area for the mold compound by providing a greater